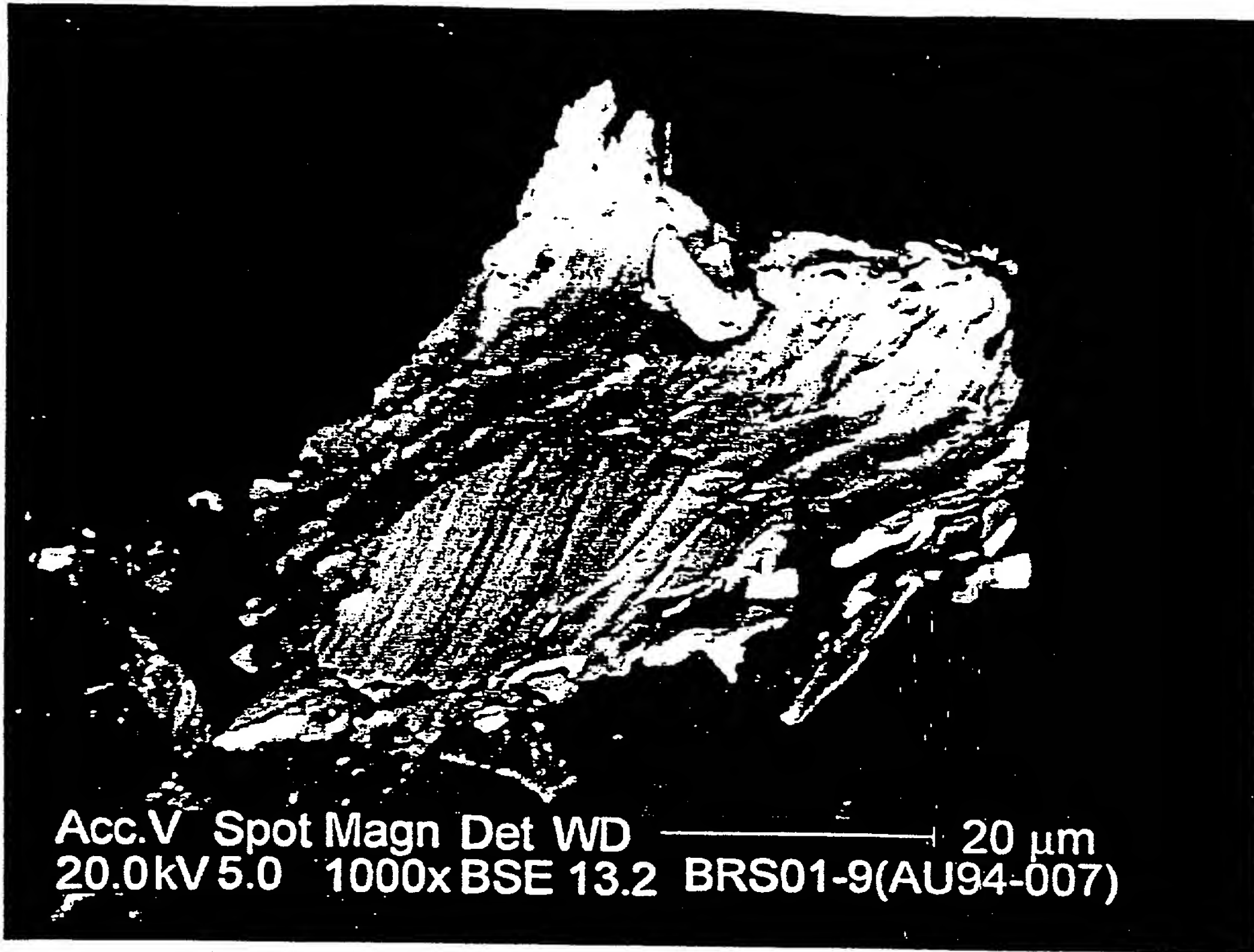
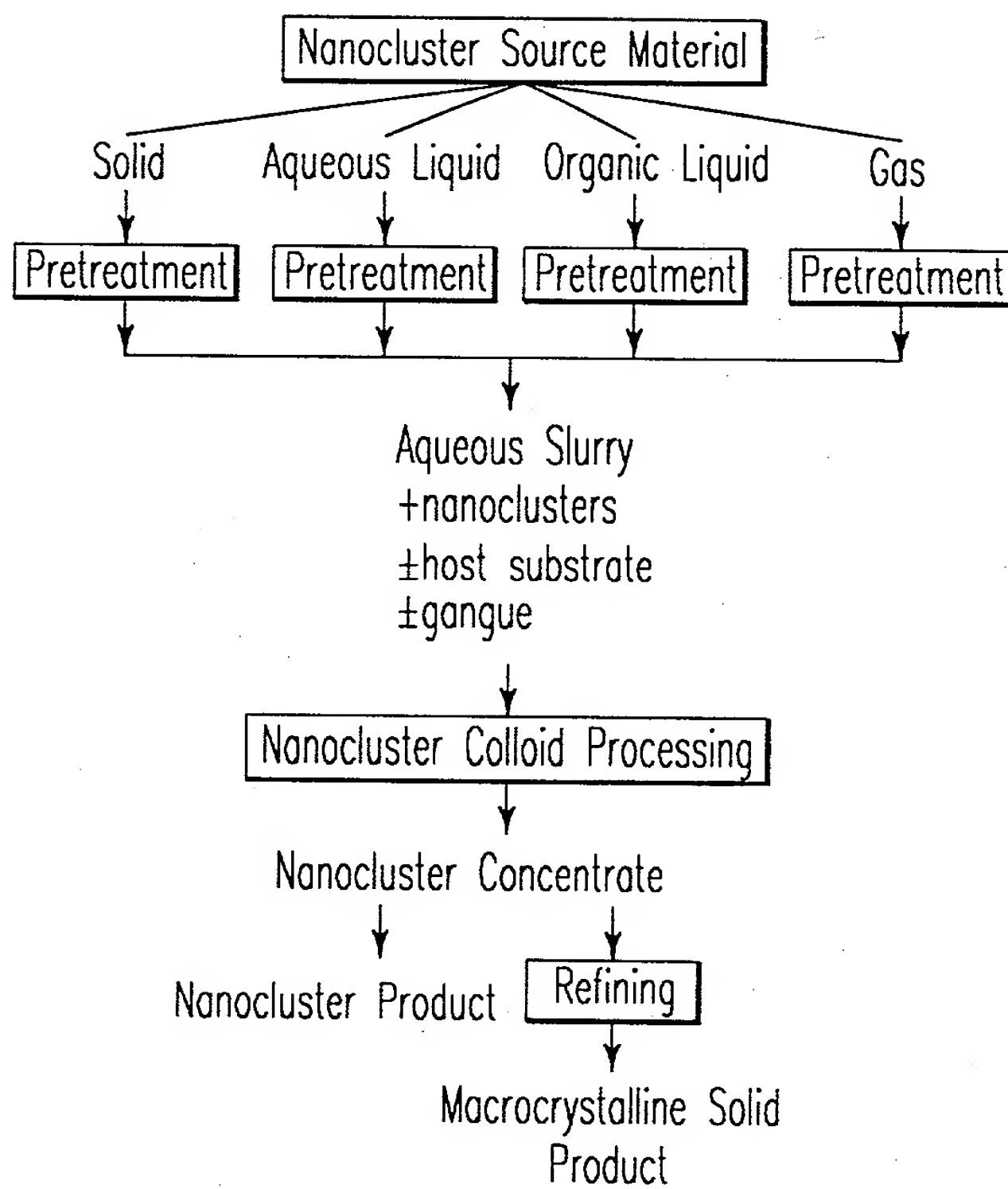


*FIG. 1*



*FIG. 2*



*FIG. 3*

**FIG. 4A** SOLID NANOCLUSTER SOURCE MATERIAL

- OP: PREVENT FROM DRYING
- CRUSH
- MILLING

↓ NANOCLUSTERS + HOST SUBSTRATE + GANGUE ± WATER

- SLURRY
- ⇒ TO NANOCLUSTER COLLOID PROCESSING

**FIG. 4B** AQUEOUS LIQUID NANOCLUSTER SOURCE MATERIAL

- OP: PREVENT FROM DRYING
  - ⇒ OP: TO NANOCLUSTER COLLOID PROCESSING
- PHASE SEPARATION

• WATER: to water treatment or recycle

↓ NANOCLUSTERS ± HOST-SUBSTRATE ± GANGUE

- SLURRY
- ⇒ TO NANOCLUSTER COLLOID PROCESSING

**FIG. 4C** ORGANIC LIQUID NANOCLUSTER SOURCE MATERIAL

- OP: PREVENT FROM DRYING
- PHASE SEPARATION
  - WATER: to aqueous liquid pretreatment, water treatment or recycle
  - ↓ ORGANIC LIQUID + NANOCLUSTERS ± HOST-SUBSTRATE
- PHASE SEPARATION
  - ORGANIC LIQUID: to hydrocarbon processing
  - ↓ NANOCLUSTERS ± HOST-SUBSTRATE ± GANGUE
- SLURRY
- ⇒ TO NANOCLUSTER COLLOID PROCESSING

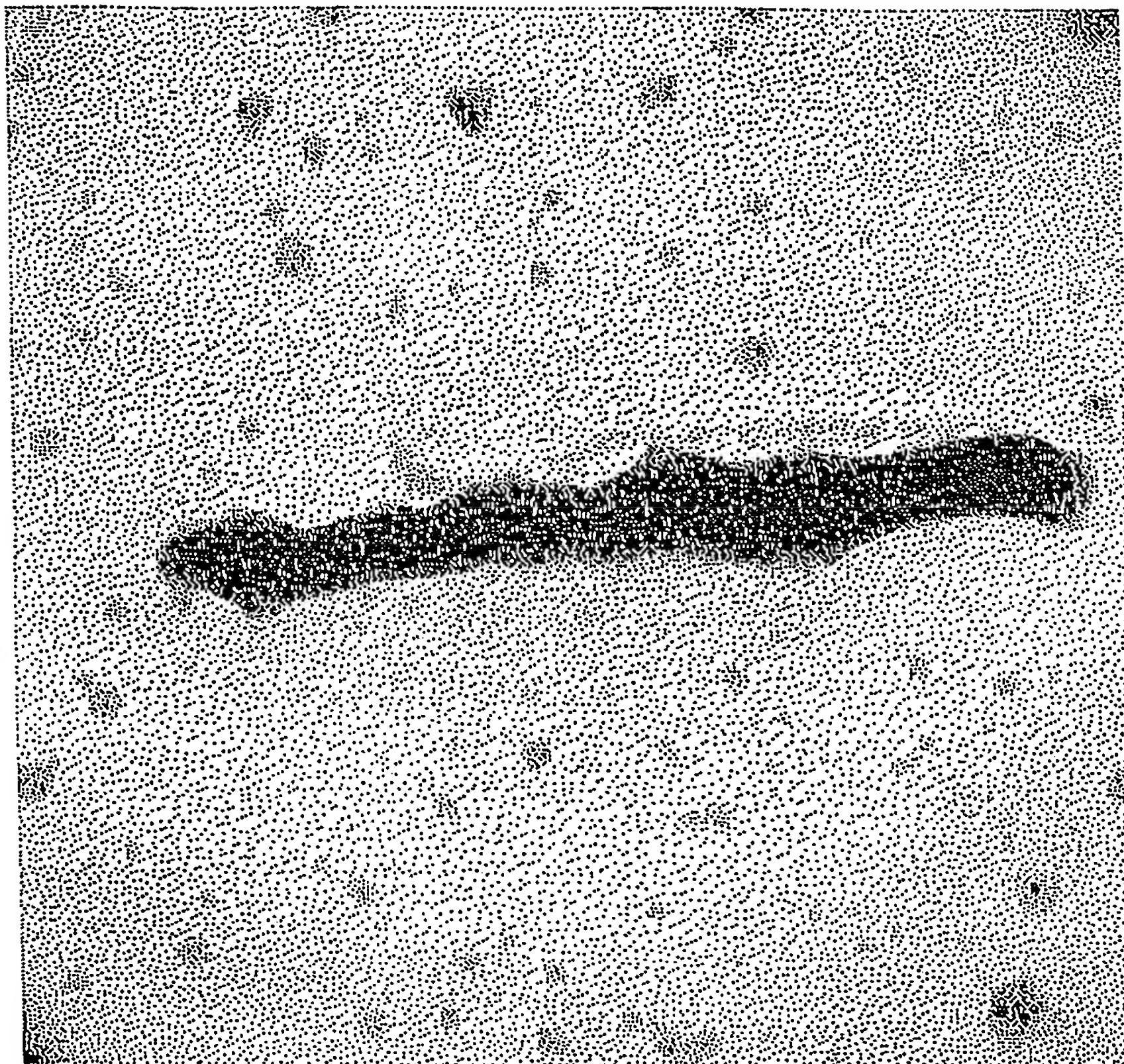
**FIG. 4D** GASEOUS NANOCLUSTER SOURCE MATERIAL

- CONDENSOR
- SCRUBBER(S)
  - GAS: to gas processing
  - ↓ WATER + NANOCLUSTERS ± HOST-SUBSTRATE
  - ⇒ OP: TO NANOCLUSTER COLLOID PROCESSING
- PHASE SEPARATION
  - WATER: to water treatment or recycle
  - ↓ NANOCLUSTERS ± HOST-SUBSTRATE
- SLURRY
- ⇒ TO NANOCLUSTER COLLOID PROCESSING

- NANOCLUSTERS ± HOST SUBSTRATE ± GANGUE ± WATER (from pretreatment)
  - OP: SLURRY CONDITIONING
  - OP: PHASE SEPARATION
    - WATER: to water treatment or recycle
    - ↓ ORGANIC LIQUID + NANOCLUSTERS ± HOST-SUBSTRATE
  - COLLOID REGENERATION
  - GEL HYDRATION
  - COLLOID PEPTIZATION
  - OP: HEAT & PRESSURE TREATMENT
  - DISPERSION
  - NANOCLUSTER COLLOID DESORPTION
  - PHASE SEPARATION
    - DEPLETED HOST SUBSTRATE + GANGUE: to recycle or tailings
    - ↓ AQUEOUS NANOCLUSTER COLLOID SOLUTION
  - NANOCLUSTER COLLOID RECOVERY
  - PHASE SEPARATION, or
  - ADSORPTION
    - WATER: to water treatment or recycle
    - ↓ NANOCLUSTER CONCENTRATE
  - OP: REFINE
  - ↓ MACROCRYSTALLINE SOLID PRODUCT

*FIG. 5*





*FIG. 6*